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AUTHOR Hymel, Glenn M.
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ABSTRACT

John B. Carroll's Model of School Learning is a paradigm which describes the degree of learning that takes place in school setting as a function of the time spent on a learning task divided by the time needed for its mastery. The components of opportunity and perseverance in Carroll's model have particular relevance to a form of school organization such as nongradedness which has as its primary objective the provision of unlimited time opportunity during which a student can actively engage in a learning task until the time spent is commensurate with the time needed. The purpose of this study is twofold: 1) to identify Carroll's model as a possible theoretical basis for the organizational structuring of schools and 2) to test seven hypotheses derived from the model which concern the amount of perseverance and the degree of learning that actually occur under varying conditions of quality of instruction and ability to understand instruction when unlimited time opportunity is available. The sample consists of 160 students divided into three ability levels, randomly assigned to two levels of treatment. Statistical analysis are made by way of ANOVA, ANCOVA, and Fisher's transformation to z. (Author)

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AN APPLICATION AND INVESTIGATION OF JOHN B. CARROLL'S MODEL OF SCHOOL LEARNING IN A NONGRADED ORGANIZATIONAL SETTING

by

Glenn M. Hymel

Louisiana State University

in New Orleans

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AN APPLICATION AND INVESTIGATION OF JOHN B. CARROLL'S MODEL OF SCHOOL LEARNING IN A NONGRADED ORGANIZATIONAL SETTING*

Varied attempts by educators to accommodate the individual differences extant among students in a school setting are quite frequently hindered or facilitated by the vertical pattern of organization--graded or nongraded--under which a school functions. Bloom (1968) has observed that the vast majority of educational institutions throughout the world are organized on a graded basis, that is, organized to provide group instruction with specified and limited periods of time allowed for the mastery of a given learning task. It is his position that "whatever the amount of time allowed by the school and the curriculum for particular subjects or learning tasks, it is likely to be too much for some students and not enough for other students (p. 7)."

In response to this obvious limitation of the graded school, the nongraded form of school organization has been suggested as a viable alternative. In essence, the nongraded school allows for the progression of a student through the contents of a given subject independent of any constant time boundaries. In other words, the subject matter (arranged in learning sequences) is the

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constant while the time allowed for the mastery of the topics is the variable.

Past Approaches Taken in Research on Organizational Structure

The theoretical rationale which has been identified as the basis for nongradedness is the position that learners differ individually with respect to their potentialities for achievement and interest in various subject areas and therefore must be permitted to operate under a form of school organization which is amenable--and indeed conducive--to each student progressing at a rate dictated by his own capabilities.

As a result of this theoretical orientation, past research concerning the vertical structuring of schools has attempted to demonstrate the superiority of nongradedness over gradedness as the most viable organizational approach to accommodating the individual differences among students. According to Otto (1971), much of this research has been rather contradictory and inconclusive.

Purpose of the Study

It is the contention of this writer that what is needed in the way of research concerning the organizational structuring of schools is not just simply a comparison of nongradedness to gradedness on different dependent variables. Although this methodological approach undoubtedly has some merit by virtue of its comparative nature, it appears that a research strategy which

looks directly at the theoretical basis for school organization is in dire need.

With this in mind, then, the objectives of the study presently being conducted include the following:

1. To utilize John B. Carroll's Model of School Learning as a framework for implementing a mastery learning strategy in a nongraded setting.

2. To identify Carroll's model as a possible theoretical basis for administrative decisions regarding the organizational structuring of schools.

3. To test certain hypotheses derived from the model which have implications concerning school organization.

The Carroll Model of School Learning

John B. Carroll (1963) has formulated A Model of School Learning which is a paradigm describing the degree of learning that takes place in a school setting as a function of the time spent on a learning task divided by the time needed for its mastery. The basic formulation can be expressed as follows:

$$\text{Degree of Learning} = f\,\frac{\text{(Time Spent)}}{\text{(Time Needed)}}$$

The following five components comprise the model: (1) opportunity--the amount of time allowed or made available for learning; (2) perseverance--the amount of time the learner is willing to spend actively engaged in a learning task; (3) aptitude--the amount of

time the student will need to learn the task under optimal instructional conditions; (4) ability to understand instruction--the ability of the learner to understand the nature of the task he is to learn and the procedures he is to follow in the learning of the task, a combination of general and verbal intelligence; (5) quality of instruction--the degree to which the presentation, explanation, and ordering of elements of the task to be learned approach the optimum for a given learner. Opportunity and perseverance function as determinants of time spent while aptitude, ability to understand instruction, and quality of instruction serve as determinants of time needed.

This study is currently testing a total of seven hypotheses concerning the amount of perseverance and the degree of learning that actually occur under varying conditions of quality of instruction and ability to understand instruction when unlimited time opportunity is made available in a nongraded structure.

Review of the Literature

There presently exists a dearth of research concerning the effect of quality of instruction and/or ability upon the perseverance exhibited by students in a learning situation. In a setting of unlimited time allowed for learning, though, Carroll & Spearritt (1967) did investigate the interaction between quality of instruction and ability to understand instruction relative to perseverance. Two instructional booklets were prepared to teach some rules about verbs of an artificial language. Form A

(representing high quality of instruction) and Form B (representing low quality of instruction) were randomly assigned to a sample of 208 sixth graders who had been divided into three intelligence groups: high, above-average, and average to low. A difficult post-experimental task was assigned to both groups. Students who were in the high quality of instruction group for the main learning task spent more time on the post-task if they were in the high or low ability group, but not in the middle intelligence group. It was speculated that the middle ability group applied themselves more in a setting of low quality of instruction while those with high and low IQ's tended to lose interest. Thus, it appeared that low quality of instruction may function to decrease perseverance for high- and low-intelligence students and increase it for students of average intelligence.

With respect to the variables of quality of instruction and ability relative to degree of learning, Carroll & Spearritt (1967) found no significant interaction; high IQ children were just as much affected by poor quality of instruction as were the students of average and poor ability. However, Kim et al. (1969) did present evidence suggesting that mastery learning conditions (high quality of instruction) were most effective for students with below-average ability. Both of these studies were conducted under the confines of fixed time limitations. Silberman & Coulson (1964), while investigating the same interaction under conditions of a self-paced (tutorial) program, corroborated the findings of

Kim et al. with the observation that the brighter students tended to be less affected by deficient programs than students of lower ability.

Methodology

The sample in this investigation is identical to a population of 160 high school students enrolled in a particular learning sequence involving algebraic topics. This group has been divided into three levels of ability--high, medium, and low--as determined by total IQ scores attained on the California Short-Form Test of Mental Maturity, 1963 Revision. Students within each of these three ability levels were then randomly assigned to two levels of treatment. The mastery learning group, designated as high quality of instruction, involves the use of performance objectives and formative evaluation/learning correctives. The control group, labelled as low quality of instruction, entails only the use of performance objectives.

The Posttest-Only Control Group Design is being employed. The combination of two levels of treatment and three levels of ability results in a fixed-effects factorial design. ANOVA and ANCOVA will be used on the criterion measures of perseverance and degree of learning, respectively. Differences between coefficients of correlation will be tested by way of Fisher's transformation to z. Decisions regarding statistical significance will be made at the .05 level.

Data Source

Degree of learning is being assessed by a summative achievement posttest based upon the specific learning tasks to which the students are exposed. Subsequent to the completion of the posttest, the subjects are presented a brief instructional package consisting of (1) explanatory material on a new algebraic topic and (2) a single mathematical problem pertaining to the same topic. In a highly controlled setting, each student is requested to read the instructional material and then to solve the problem. Measures of perseverance are then obtained by way of the total number of minutes and seconds spent by each subject on the learning task.

Research Findings To Be Reported

Results of the investigation will be reported in terms of the following seven null hypotheses:

1. There is no significant difference between the two treatment groups relative to perseverance.

2. There is no significant interaction between quality of instruction and ability to understand instruction relative to perseverance.

3. There is no significant difference between the two treatment groups relative to the correlation between ability to understand instruction and perseverance.

4. When adjusted for perseverance, there is no significant difference between the two treatment groups relative to degree of learning.

5. When adjusted for perseverance, there is no significant interaction between quality of instruction and ability to understand instruction relative to degree of learning.

6. There is no significant difference between the two treatment groups relative to the correlation between ability to understand instruction and degree of learning.

7. With all other factors equal, the degree of learning is not a function of perseverance whether under high quality of instruction or low quality of instruction.

Educational Significance of the Study

Carroll's model purports to contain, directly or indirectly, every element required to account for an individual's success or failure in school learning. More importantly, the components of opportunity and perseverance have particular relevance to the nongraded form of organization which has as its primary objective the provision of flexible time allotments during which a student can actively engage in a learning task until his time spent is commensurate with his time needed.

What is needed, then, is an investigation as to the amount of perseverance and the degree of learning that actually occur under varying conditions of quality of instruction and ability to understand instruction when unlimited time opportunity is available. The collection of data regarding the above-mentioned hypotheses will provide an empirical base from which one could react to the validity of Carroll's model as it is presently formulated.

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